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1. (Amended) Optical amplifier equipment that amplifies optical data signals in a fiber-optic communications link that has at least one span of transmission fiber for carrying the optical data signals, comprising:

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a Raman pump that produces Raman pump light that creates Raman gain for the optical data signals in the span of transmission fiber;

a first optical monitor that measures a first wavelength of backscattered Raman pump light from the span of transmission fiber;

a second optical monitor that measures a second wavelength of the backscattered Raman pump light that is different than the first wavelength of backscattered Raman pump light; and

a control unit that uses the Raman pump and the optical monitors to perform optical time domain reflectometry measurements on the transmission fiber.

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12. (Amended) Optical amplifier equipment that amplifies optical data signals in a fiber-optic communications link that has at least one span of transmission fiber for carrying the optical data signals, comprising:

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a Raman pump that produces Raman pump light that creates Raman gain for the optical data signals in the span of transmission fiber;

a first optical monitor that measures a first wavelength of backscattered Raman pump light from the span of transmission fiber;

a second optical monitor that measures a second wavelength of the backscattered Raman pump light;

a wavelength-division-multiplexing coupler that separates the backscattered Raman pump light by wavelength and directs the separated backscattered Raman pump light to the first and second optical monitors, respectively; and

a control unit that uses the Raman pump and the optical monitors to perform optical time domain reflectometry measurements on the transmission fiber.

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15. (Amended) Optical amplifier equipment for amplifying optical data signals in a fiber-optic communications link that has at least one span of transmission fiber for carrying the optical data signals, comprising:

a Raman pump for producing Raman pump light to create Raman gain for the optical data signals in the span of

transmission fiber, wherein the Raman pump light and the optical data signals propagate in opposite directions in the span of transmission fiber;

at least one optical monitor; and

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Control

a control unit that uses the Raman pump to provide modulated Raman pump light to the span of transmission fiber and that uses the optical monitor to measure corresponding backscattered Raman pump light from the span of transmission fiber, wherein the control unit is configured to modulate the Raman pump light during use of the optical data signals to carry normal data traffic on the span of transmission fiber.

16. (Amended) Optical amplifier equipment for amplifying optical data signals in a fiber-optic communications link that has at least one span of transmission fiber for carrying the optical data signals, comprising:

a Raman pump for producing Raman pump light to create Raman gain for the optical data signals in the span of transmission fiber, wherein the Raman pump light and the optical data signals propagate in opposite directions in the

span of transmission fiber, and wherein the Raman pump produces pump light at a first wavelength and a second wavelength;

first and second optical monitors for measuring the backscattered Raman pump light from the span of transmission fiber at the first and second wavelengths, respectively; and

a control unit that uses the Raman pump to provide modulated Raman pump light to the span of transmission fiber and that uses the optical monitor to measure corresponding backscattered Raman pump light from the span of transmission fiber.

17. (Amended) Optical amplifier equipment for amplifying optical data signals in a fiber-optic communications link that has at least one span of transmission fiber for carrying the optical data signals, comprising:

a Raman pump for producing Raman pump light to create Raman gain for the optical data signals in the span of transmission fiber, wherein the Raman pump light and the optical data signals propagate in opposite directions in the span of transmission fiber, and wherein the Raman pump produces pump light at a first wavelength and a second wavelength;

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